EPA Region 7 TMDL Review

TMDL ID: KS-UA-01-286_01 **State:** KS
Document Name: ARKANSAS RIVER

Basin(s): UPPER ARKANSAS
HUC(s): 11030001
Water body(ies): ARKANSAS RIVER
Tributary(ies):
Pollutant(s): SELENIUM

Submittal Date: 9/5/2007 **Approved:** Yes

Submittal Letter

State submittal letter indicates final Total Maximum Daily Load(s) (TMDL) for specific pollutant(s)/water(s) were adopted by the state, and submitted to EPA for approval under section 303(d) of the Clean Water Act [40 CFR § 130.7(c)(1)]. Include date submitted letter was received by EPA, date of receipt of any revisions, and the date of original approval if submittal is a phase II TMDL.

Kansas Department of Health and Environment (KDHE) submitted this TMDL for approval with a letter received by the United States Environmental Protection Agency (EPA), Region 7 on September 5, 2007. A revised version addressing EPA comments was received by email attachment on October 26, 2007.

Water Quality Standards Attainment

The water body's loading capacity (LC) for the applicable pollutant is identified and the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources is described. TMDL and associated allocations are set at levels adequate to result in attainment of applicable water quality standards (WQS) [40 CFR § 130.7(c)(1)]. A statement that WQS will be attained is made.

The LC is set by a load duration curve (LDC) linking the chronic selenium criterion, 5 ug/L, and flow. LDCs are developed for the Arkansas River at the CO/KS state line and below Garden City, KS. The targeted criterion for aquatic life will also result in the attainment of the groundwater recharge use.

Meeting the LC established by the LDCs will result in the attainment of WQS.

Numeric Target(s)

Submittal describes applicable WQS, including beneficial uses, applicable numeric and/or narrative criteria. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.

The applicable WQS is that for chronic aquatic life, 5 ug/L selenium (KAR 28-16-28e (c) (2) (D) (ii)).

In surface waters designated for the groundwater recharge use, water quality shall be such that, at a minimum, degradation of ground water quality does not occur. Degradation shall include any statistically significant increase in the concentration of any chemical or radiological contamination or infectious microorganism in ground water resulting from surface water infiltration or injection (KAR 28-16-28e(2) (5)).

All beneficial uses are assigned (Domestic Water Supply, Food Procurement, Groundwater Recharge, Irrigation

Water, Industrial Water, and Livestock Watering) with Special Aquatic Life Support and Primary Contact Recreation.

The impaired uses are listed as Special Aquatic Life Support and Groundwater Recharge.

The submittal also cites the WQS section which is concerned with the setting of background concentrations of naturally occurring substances as numeric criteria (KAR 28-16-28b(e)).

The submittal does target the currently approved WQS of 5 ug/L of selenium.

Pollutant(s) of concern

An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety (MOS) that do not exceed the LC. If submittal is a phase II TMDL there are refined relationships linking the load to WQS attainment. If there is an increase in the TMDL there is a refined relationship specified to validate the increase in TMDL (either load allocation (LA) or waste load allocation (WLA)). This section will compare and validate the change in targeted load between the versions.

The linkage between the pollutant and impairment is direct. The TMDL target is set at the chronic WQS for selenium. This is expressed as LDCs at the CO/KS state line and below Garden City, KS.

Source Analysis

Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, nonpoint and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered. If this is a phase II TMDL any new sources or removed sources will be specified and explained.

There are four significant National Pollution Discharge Elimination System (NPDES) permitted facilities in the watershed. Garden City WWTP (KS0038962), Sunflower Electric Power (KS0080063), Lakin WWTP (KS0094196), and Swift Beef Company (KS0092347). Non-discharging facilities are listed in the submittal's appendices. The Swift Beef facility is currently closed. All facilities at this time are using analytical processes that have limits of detection above the chronic WQS. The typical load of selenium from point source facilities are pass throughs from background source water which then passes through the facilities.

High concentrations of selenium are found in ground water and in supply wells in the watershed. Garden City uses reverse osmosis treatment system for its water supply to remove the selenium found in its source wells.

Water use and irrigation return flows are linked in the submittal to elevated selenium concentrations in the Arkansas River. Low flows below John Martin Reservoir in Colorado are associated with elevated selenium concentrations in the Arkansas River. The submittal states the Arkansas River is the principal source of irrigation water in Colorado. The upper watershed in Kansas also uses the river for irrigation with groundwater sources primarily used in the lower segments. The source of the selenium in the watershed is the Pierre Shale in eastern Colorado. Additional geological patterns which may contribute to elevated concentrations are the Niobrara Chalk and Graneros Shale formations in Kansas.

The discussion of natural background and irrigation returns listed here are a condensation of the extensive treatment given in the submittal. For an expanded explanation the TMDL should be consulted. EPA considers the source analysis has taken into account all significant sources.

Allocation - Loading Capacity

Submittal identifies appropriate WLA for point, and load allocations for nonpoint sources. If no point sources are present the WLA is stated as zero. If no nonpoint sources are present, the LA is stated as zero [40 CFR § 130.2 (i)]. If this is a phase II TMDL the change in LC will be documented in this section.

The LC is set at the WQS criterion for chronic selenium, 5 ug/L, across the range of flow in the Arkansas River.

WLAs are set for four permitted facilities and a LA is set for nonpoint source loads.

The submittal also has potential TMDLs to address seasonal differences in background selenium concentrations. These alternative seasonal TMDLs are not approvable at this time because there are no approved site specific selenium concentrations that correspond to those TMDL LDCs.

This approval is limited to the LDCs which set WLA/LA/MOS at the approved WQS criterion of 5 ug/L total selenium.

WLA Comment

Submittal lists individual WLAs for each identified point source [40 CFR § 130.2(h)]. If a WLA is not assigned it must be shown that the discharge does not cause or contribute to WQS excursions, the source is contained in a general permit addressed by the TMDL, or extenuating circumstances exist which prevent assignment of individual WLAs. Any such exceptions must be explained to a satisfactory degree. If a WLA of zero is assigned to any facility it must be stated as such [40 CFR § 130.2(i)]. If this is a phase II TMDL any differences in phase I and phase II WLAs will be documented in this section.

The total WLA is set at 0.49lbs/day.
By facility this is;

Garden City WWTP (KS0038962)	0.25 lbs/day
Sunflower Electric Power (KS0080063)	0.06 lbs/day
Lakin WWTP (KS0094196)	0.01 lbs/day
Swift Beef Company (KS0092347)	0.17 lbs/day

LA Comment

Includes all nonpoint sources loads, natural background, and potential for future growth. If no nonpoint sources are identified the LA must be given as zero [40 CFR § 130.2(g)]. If this is a phase II TMDL any differences in phase I and phase II LAs will be documented in this section.

At normal flows (50th percentile exceedance) the chronic LA is 3.7 lbs/day at the state line and 0.0 lbs/day below Garden City, KS. Additional examples are given at other flow exceedance percentiles in the submittal in table 9. The site below Garden City, KS does not exhibit measurable flow until a flow percentile exceedance of 25 %. At 25th percentile exceedance flow the LA at the KS/CO state line is 7.0 lbs/day and 3.6 lbs/day below Garden City, KS.

Margin of Safety

Submittal describes explicit and/or implicit MOS for each pollutant [40 CFR § 130.7(c)(1)]. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided. If this is a phase II TMDL any differences in MOS will be documented in this section.

The aquatic life use MOS is the use of EPA's proposed fish tissue selenium concentration of 7.91 ug/g. The submittal lists this as an explicit MOS though a numeric linkage between water and fish tissue concentrations is not specified.

EPA accepts this as an implicit MOS for meeting the aquatic life designated use.

Seasonal Variation and Critical Conditions

Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s) [40 CFR § 130.7(c)(1)]. Critical conditions are factors such as flow or temperature which may lead to the excursion of WQS. If this is a phase II TMDL any differences in conditions will be documented in this section.

The submittal analyzes the seasonal variation in selenium concentrations based on irrigation use and return flow and water releases for reservoirs in Colorado. This seasonality is not expressed in the TMDL as the numeric criterion of 5 ug/L applies throughout the year. Note is made that if future site specific criteria are developed for the Arkansas River this seasonality will be addressed in setting LCs.

Additionally, the effect of water use in the basin results in no flow in the Arkansas River greater than 50% of

the year. During these periods the LA is set equal to zero.

Public Participation

Submittal describes required public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s) [40 CFR § 130.7(c)(1)(ii)].

The State of Kansas maintains an active internet site to make draft and approved TMDLs available to the public. This TMDL was available from June 2007 through August 2007.

Meetings were also held in 2005 and 2006 with the Ground Water Management District No. 3, Associated Ditches of Kansas and the Kansas Water Congress.

A public meeting was held on this TMDL in Garden City, KS, on June 6, 2007.

The Upper Arkansas Basin Advisory Committee met in regards to this TMDL on October 17, 2005, February 27, 2006, June 13, 2006, October 12, 2006, December 5, 2006, March 6, 2007, and May 10, 2007.

This TMDL also included interaction with the State of Colorado. Testimony was given at meetings of the Colorado Water Quality Control Commission and at a Water Quality Standards Hearing on November 13 2006 and June 11, 2007 respectively.

Comments on this TMDL were received from EPA. These comments were addressed in the revised submittal of October 26, 2007.

Monitoring Plan for TMDL(s) Under Phased Approach

The TMDL identifies a monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used) [40 CFR § 130.7].

The submittal defines sampling stations and frequencies for implementation monitoring along with the gage stations in place to monitor flow.

Monitoring in permitted facilities' effluent for selenium will be a condition of future NPDES permits.

The Division of Water Resources will monitor water use, tailwater returns and stream flow gains and losses in the Arkansas River.

Management practices outlined in this TMDL will be evaluated for effectiveness in improving the water quality of the Arkansas River in 2011. The river will be evaluated for delisting based on monitoring data during the 2008-2015 time period and a decision will be made for the 2016 303(d) listing cycle.

This TMDL will be incorporated into the Kansas Continuing Planning Process and Water Quality Management Plan.

EPA considers the monitoring plan to be sufficient.

Reasonable Assurance

Reasonable assurance only applies when less stringent WLAs are assigned based on the assumption of nonpoint source reductions in the LA will be met [40 CFR § 130.2(i)]. This section can also contain statements made by the state concerning the state's authority to control pollutant loads.

Reasonable assurances are not required as less stringent WLAs are not assigned based on an assumption of more stringent LAs. Though not required, the submittal does include funding mechanisms available for the implementation of nonpoint source abatements.